AD-A072 561 AIR FORCE PACKAGING EVALUATION AGENCY WRIGHT-PATTERSO--ETC F/G 13/4
TESTING OF REDESIGNED GAU-8/A ALS AMMUNITION CONTAINERS.(U)
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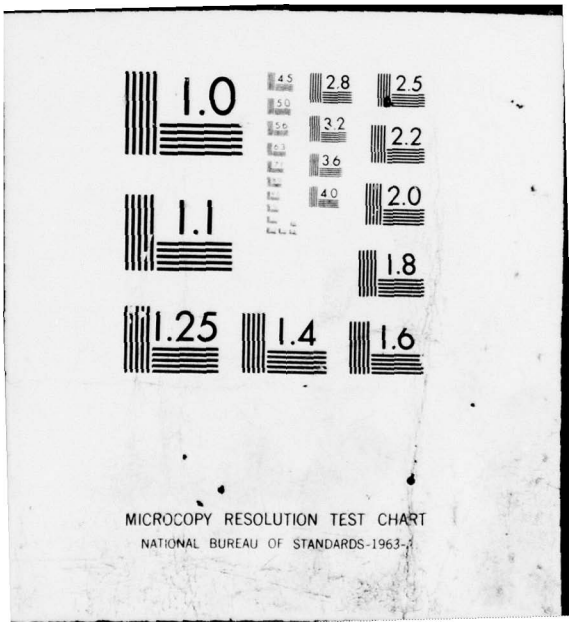
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AFPEA PROJECT NO. 79-P7-51

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TESTING OF REDESIGNED GAU-8/A ALS AMMUNITION CONTAINERS

AFALD/PTPD
AIR FORCE PACKAGING EVALUATION AGENCY
Wright-Patterson AFB OH 45433

July 1979

NOTICE

ABSTRACT

On 27 and 28 June 1979 the Air Force Packaging Evaluation Agency conducted rough handling tests on three container designs for the GAU-8/A 30 mm ammunition. These tests were conducted at the request of ASD/YXA with data to be used in certification procedures. All three container designs successfully passed each test performed.

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PUBLICATION DATE:

7 AUG 1979

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INTRODUCTION

PURPOSE: These tests were performed to develop data for use in certification of a redesigned/modified GAU-8/A ALS ammunition container.

BACKGROUND: GAU-8/A ALS ammunition containers are intended to be used as shipping and storage containers for the 30 mm ammunition of this weapon system. In addition to the shipping and storage function, these containers are also designed to interface with the Ammunition Loading System to permit direct loading from the container to the aircraft. Due to the nature of the contents, the containers must be properly certified prior to use within the transportation system. Several containers and designs have been previously tested resulting in one configuration achieving certification. This configuration utilizes costly and highly undesireable banding procedures in securing the lid to the container. As a result a more desireable, less costly design is sought.

APPROACH

Certification requirements for redesigned GAU-8/A ALS containers were provided by ADTC/SD3P. The series of tests necessary to substantiate the container for certification is as follows:

-Vibration, IAW Method 5020 of Federal Test Method Standard 101B
-Cornerwise Drop, IAW Method 5005 of FTMS 101B
-Edgewise Drop, IAW Method 5008 of FTMS 101B
-Pendulum Impact, IAW Method 5012 of FTMS 101B
-Mechanical Handling, IAW Mehtod 5011 of FTMS 101B
-Superimposed Load Hoist Test
-Stacking Strength Test, IAW Method 5016 of FTMS 101B
-Four Foot Drop, IAW CFR 49 Paragraph 173.398(b)(3)(ii)
-Radioactive Measurements

Due to the size and weight of the containers not all tests were performed at this time. Those tests that were conducted are presented in the container test plan shown in figure 1.

Three separate container designs were submitted for testing. Description of these designs are contained in the TEST SPECIMENS section. Container design A is of special interest since it is similar to the existing certified design. The difference is that container design A has the lid securely fastened to the container by eight bolts instead of banding material. For this container design only a four foot drop test was performed since there would be little if any impact on the remaining tests by this change. Container designs B and C were not similar to any previously tested container and therefore no data existed to contribute to certification. Both container designs B and C were subjected to the tests in the container test plan shown in figure 1 to develop data should the designs be pursued.

TEST PROCEDURE

The following tests were performed in sequence for container designs

B and C. Container design A was subjected to test number 1 only. Except for test number 1, each test was performed to a test method contained in Federal Test Method Standard 101B.

TEST NO. 1 (Four Foot Drop) - Specified in CFR 49 paragraph 173.398 (b)(3)(ii), the container shall be subjected to a free drop through a distance of four feet onto a flat unyielding horizontal surface. The container shall strike the surface in a position that maximum damage is expected. In this case each container was dropped on a corner of the lid (see figure 2).

TEST NO. 2 (Cornerwise-Drop) - This test was conducted in accordance with Method 5005. Two drops from a height of 24 inches were performed on diagonally opposite corners of the container base.

TEST NO. 3 (Edgewise-Drop) - This test was conducted in accordance with Method 5008. Two drops from a height of 24 inches were performed on opposite ends of the container base.

TEST NO. 4 (Pendulum-Impact) - This test was conducted in accordance with Method 5012. Four impacts were performed, one on each side of the container. The test was performed to produce a seven (7) feet per second velocity at impact.

TEST NO. 5 (Mechanical Handling) - This test was separated into two parts. First part was lifting and transporting by forklift truck in accordance with paragraph 6.2 of Method 5011. The second part was hoisting with attachments in accordance with paragraph 6.3.2.2 of Method 5011. The container was lifted clear of the floor for a period of five (5) minutes from each lifting ring.

TEST SPECIMENS

Three container designs were tested. Container design A consisted of two containers bolted together to form one test unit. Designs B and C were individually capable of performing as one test unit without being bolted to another container. For the purpose of this test, one test unit was a single container or a number of like containers assembled to act as one unit and contained 1176 rounds of ammunition in two continuous 588 loop belts.

Container Design A - Very similar to existing designs, this container was fabricated from 16 gauge high strength steel. The primary difference was the method of attaching the lid to the container. Each lid was fastened to the container by eight bolts. One test unit consisted of two fully loaded containers bolted together. This configuration resulted in a gross weight of approximately 2,220 pounds and a tare weight of 300 pounds. Test unit dimensions are shown in figure 3.

Container Design B - Design of this container permitted loading of 1176 rounds into one container without connecting to another container. The lid was fastened to the container by ten bolts. Material was 16 gauge high strength steel. One test unit consisted of one fully loaded container resulting in a gross weight of 2,240 pounds and a tare weight of 322 pounds. Test unit dimensions are shown in figure 4.

Container Design C - Like design B, this container was capable of containing 1176 rounds. The lid was fastened to the container by two fasteners, one on each end of the container. One test unit consisted of one fully loaded container resulting in a gross weight of 2,260 pounds and a tare weight of 342 pounds. Test unit dimensions are shown in figure 5.

TEST RESULTS

Container Design A - With all sixteen bolts securely fastened in the test unit's lids, the container successfully passed the four foot drop test. Figures 6 and 7 illustrate the extent of damage incurred on the container. The test was repeated on an identical test unit with a total of eight bolts fastening the lids. The test unit successfully passed this four foot drop test with extent of damage illustrated in figure 8.

Container Design B - During hoisting of the test unit, the automatic release mechanism was accidentally tripped at a height of about three feet. This premature drop resulted in damage to the extent shown in figure 9. The test was repeated on the same test unit on the diagonally opposite corner. Dropped from four feet the test unit successfully passed this test (see figure 10). A second test unit was loaded and subjected to the remainder of the test program. This unit successfully passed all further tests.

Container Design C - Extent of damage to the test unit from the four foot drop is shown in figures 11, 12, and 13. Even though the rounds were visible, all ammunition remained in the container. This unit successfully passed the four foot drop test. A second container was loaded and subjected to the remaining tests. This unit successfully passed all these tests remaining functional throughout.

DISCUSSION

After successful completion of the four foot drop test for container design A, it was decided to repeat the test on another identical container but with only half the number of lid bolts. This was done and again the container passed the four foot drop. From this test it seems the number of bolts could be reduced in half without any detrimental effect.

CONCLUSIONS

All three container designs successfully passed the tests performed during this test program.

Container design A successfully passed the four foot drop test with four bolts in each lid.

AIR FORCE PACKAGING EVALUATION AGENCY (Container Test Plan)				AFPEA PROJECT NUMBER 79-P7-51	
CONTAINER SIZE (L X W X D) INT.	EXT. See Figures 3, 4, and 5.	(GROSS) WT	(ITEM)	CUBE	QUANTITY 3 Configurations	DATE 26 Jun 79
ITEM NAME GAU-8 30MM AMMUNITION		MANUFACTURER WAYNE H. COLONEY COMPANY, INC. LANSON INDUSTRIES, INC. (2 CONFIGURATIONS)				
CONTAINER NAME REDESIGNED GAU-8/A ALS CONTAINERS			CONTAINER COST N/A			
PACK DESCRIPTION TOP OPENING, METAL CONTAINER						
CONDITIONING N/A						

TEST NO.	TEST METHOD	PARAMETERS	ORIENTATION	INSTRUMENTED
1	CFR 49 Para 173.398(b)(3)(ii)	Four foot free drop		
2	FED-STD-101B Method 5005	Cornerwise drop (24 inches)		
3	FED-STD-101B Method 5008	Edgewise drop (24 inches)		
4	FED-STD-101B Method 5012	Pendulum impact (4 sides)		
5	FED-STD-101B Method 5011	Mechanical handling		
a.	Para 6.2	Lifting and transporting by forklift truck		
b.	Para 6.3	Hoisting with slings		

COORDINATION

SYMBOL	NAME	DATE
PTPP	Buffington	27 Jun 79
SD3E	[illegible]	27 Jun 79
AFISC/SEV	[illegible]	27 Jun 79

COMMENTS: This is five of the specified seven tests necessary to qualify the redesigned ALS container for packaging and transportation certification of hazardous materials. The remaining two tests are (1) vibration (Method 5020) and (2) radioactive measurements, both of which exceed AFPEA capabilities for this container. Two additional tests that must also be done are (1) the 11,400 lb superimposed load hoist test and (2) 9,600 lb stacking test.

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APPROVED BY: Ralph Zynda
RALPH ZYNDA, Chief, Design Division, AFPEA

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FIGURE 1

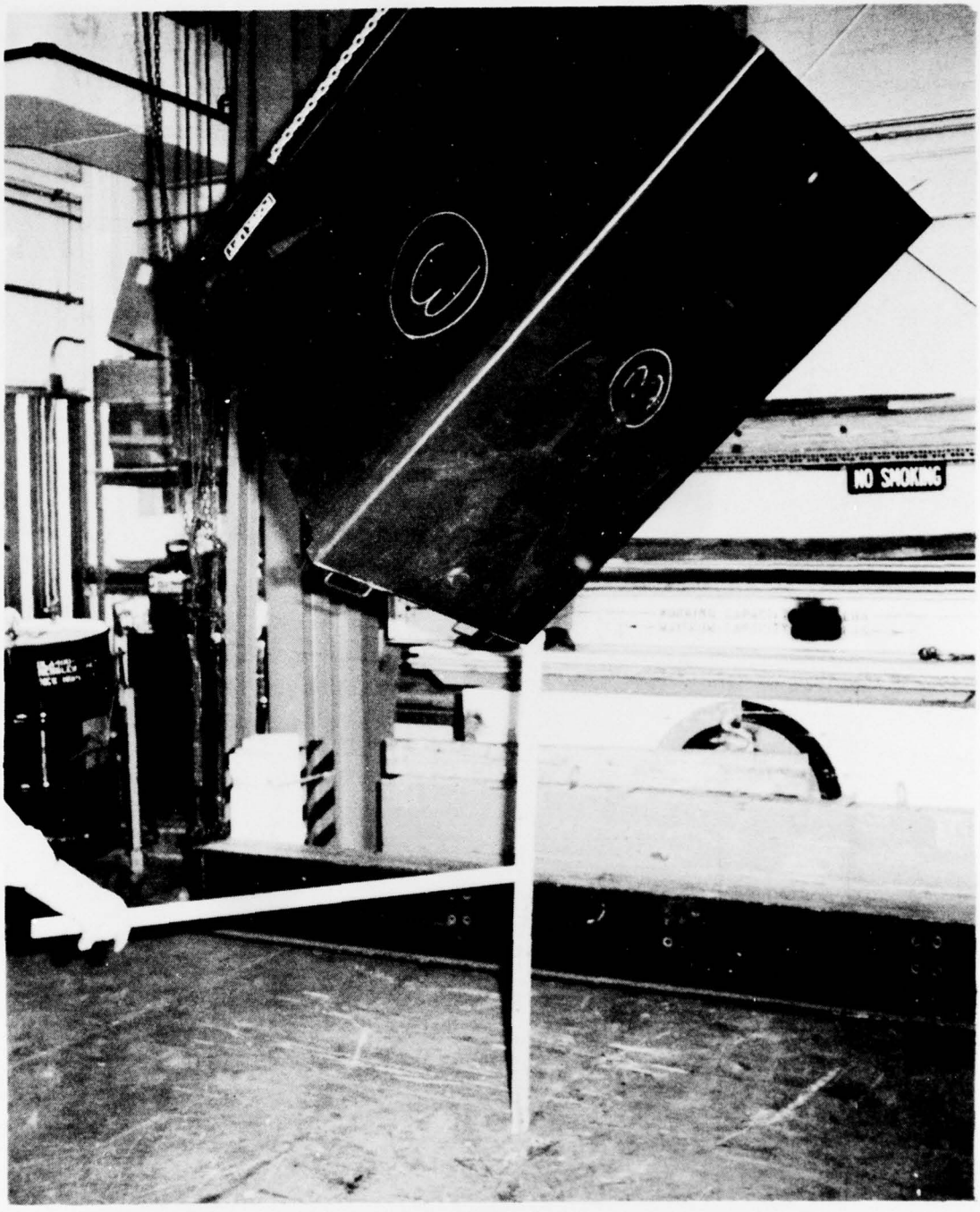

FIGURE 2. FOUR FOOT DROP TEST SET-UP

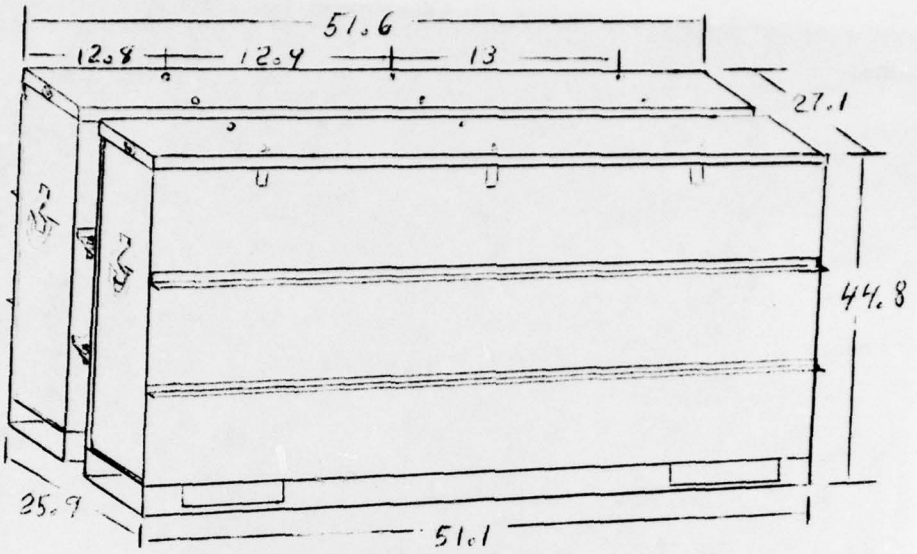

FIGURE 3. CONTAINER DESIGN A

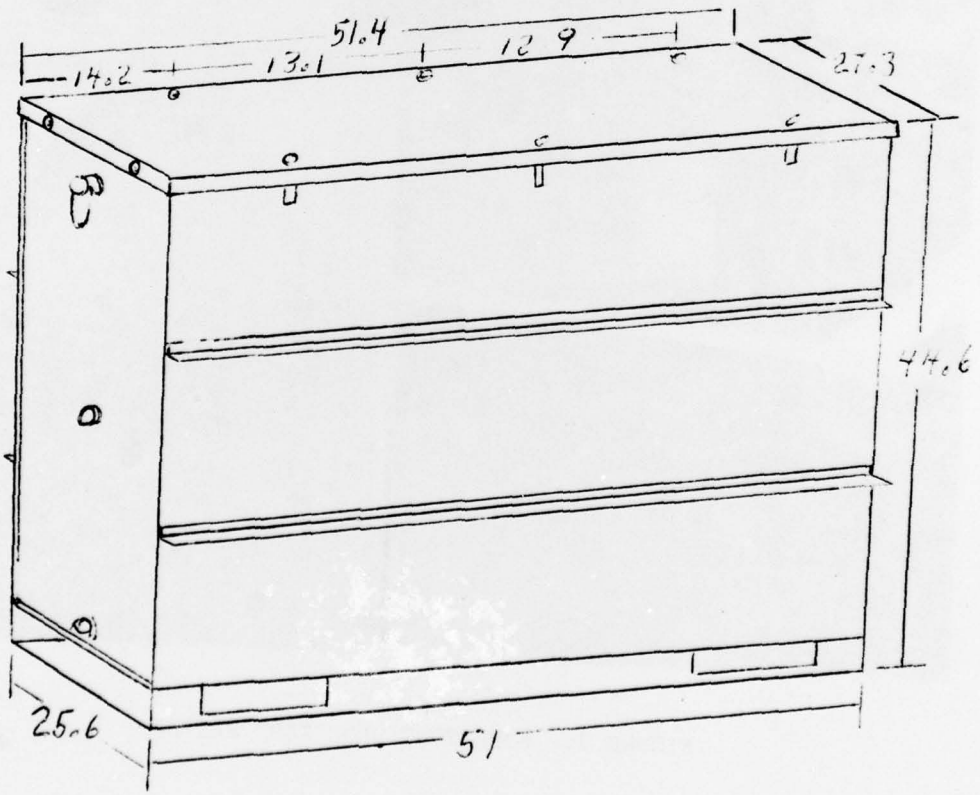

FIGURE 4. CONTAINER DESIGN B

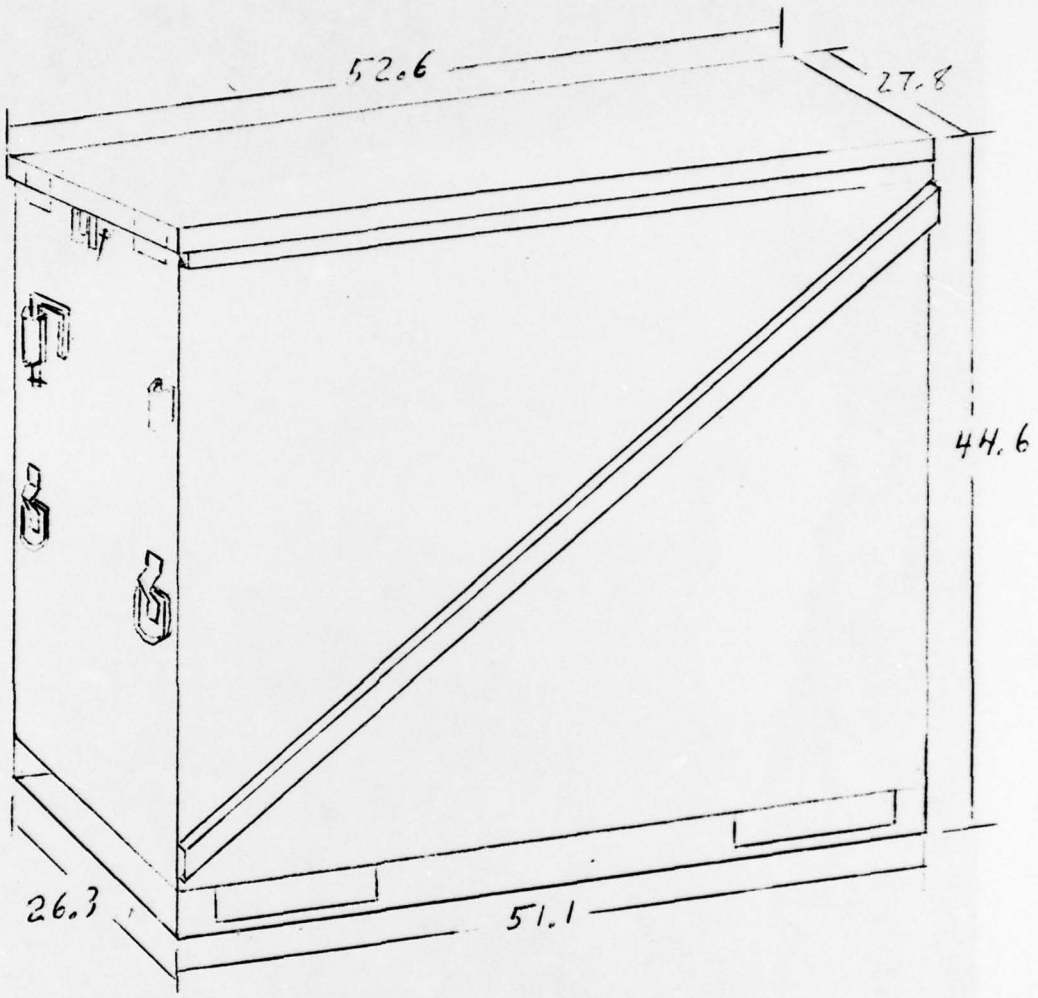

FIGURE 5. CONTAINER DESIGN C

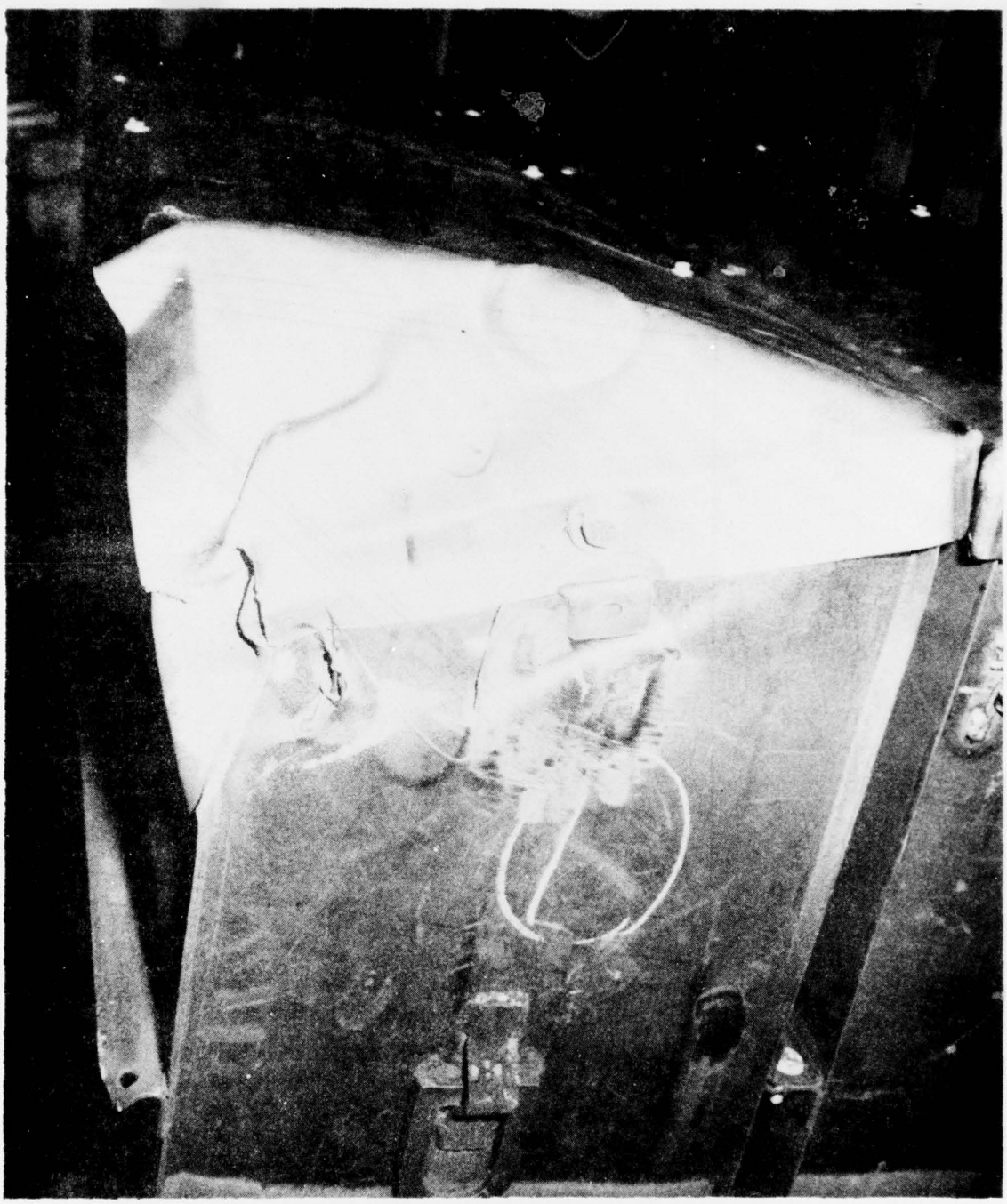

FIGURE 6. DAMAGE TO DESIGN A BY FOUR FOOT DROP

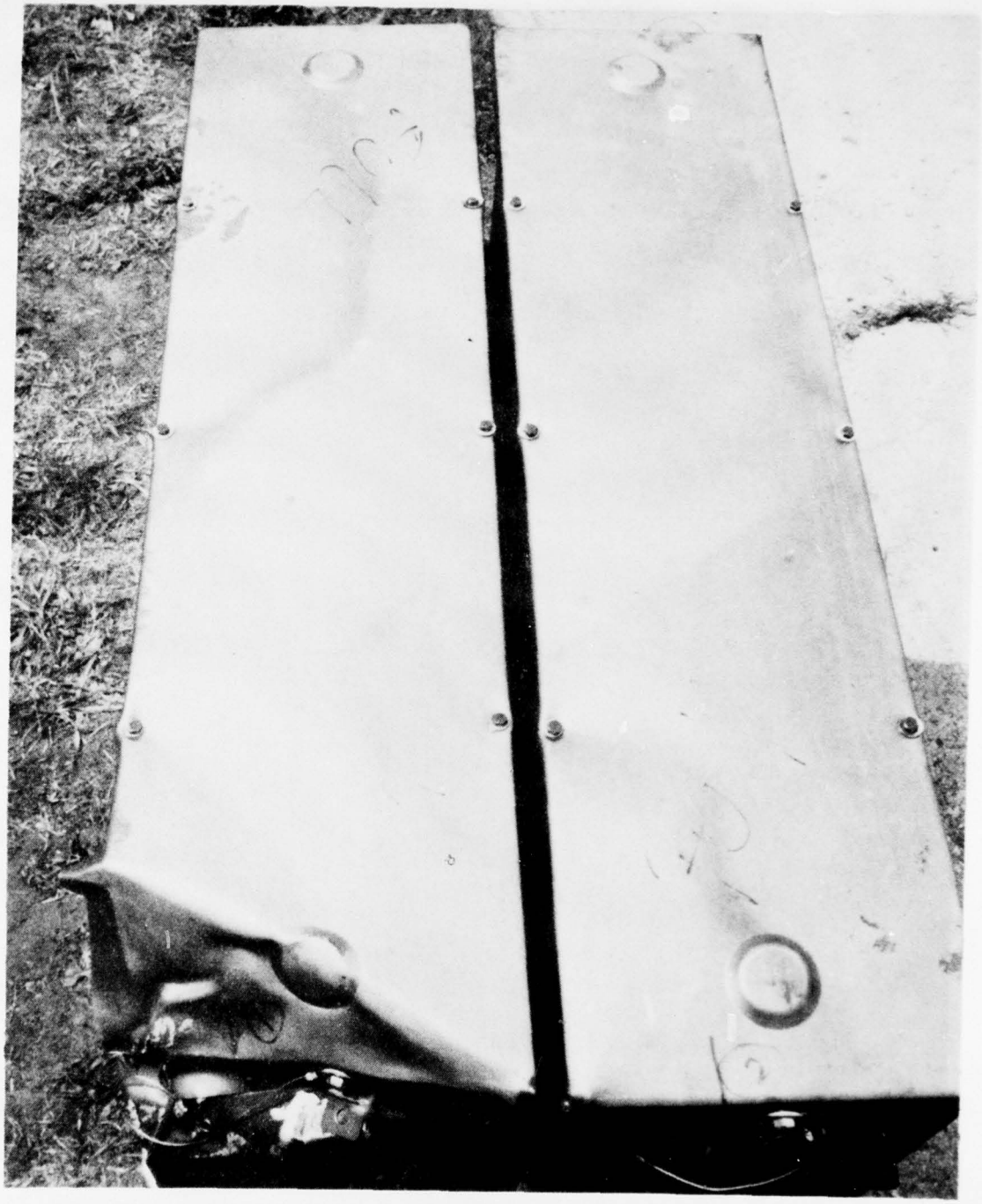

FIGURE 7. DAMAGE TO DESIGN A BY FOUR FOOT DROP
(TOP VIEW)

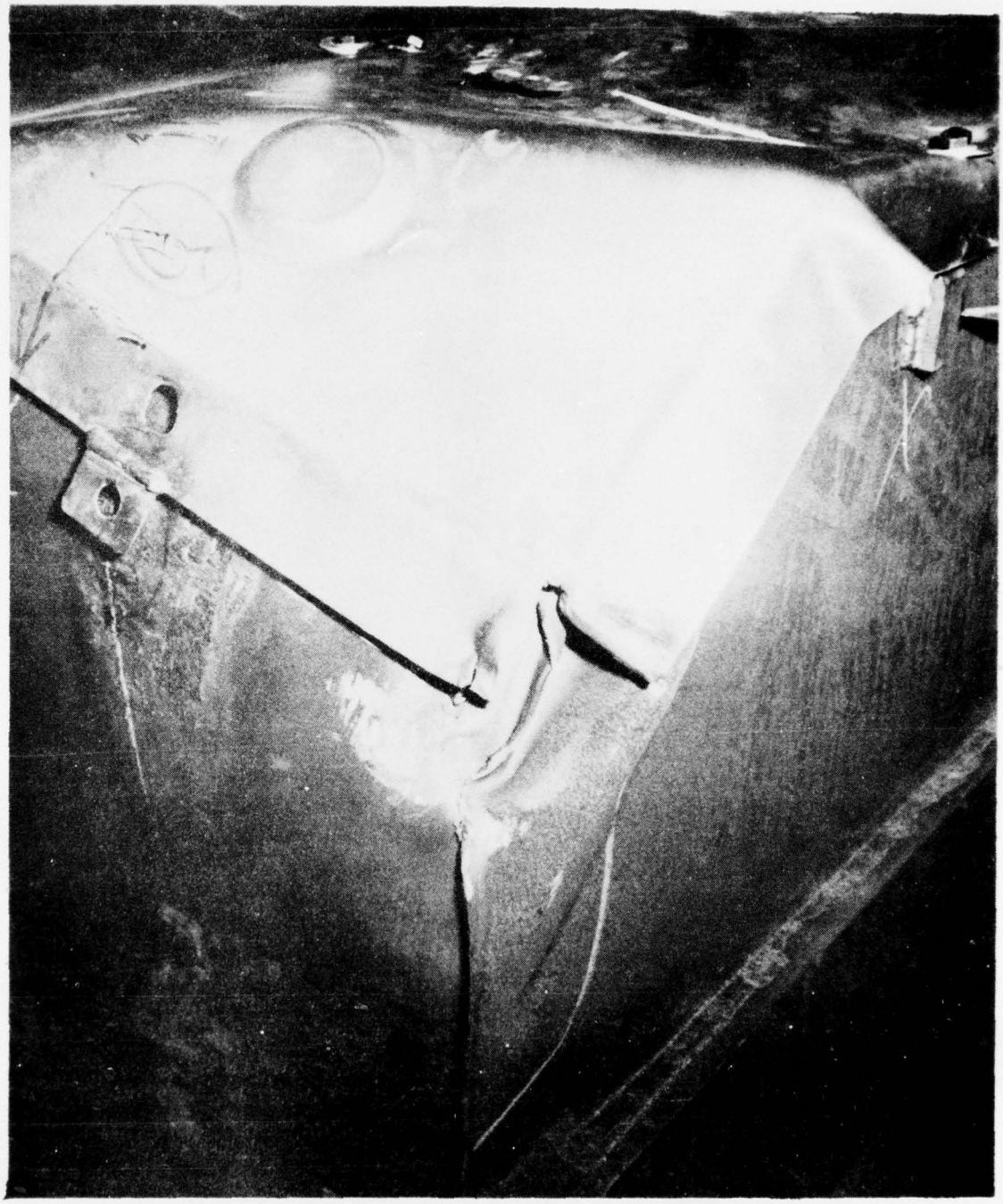

FIGURE 8. DAMAGE TO MODIFIED DESIGN A
BY FOUR FOOT DROP

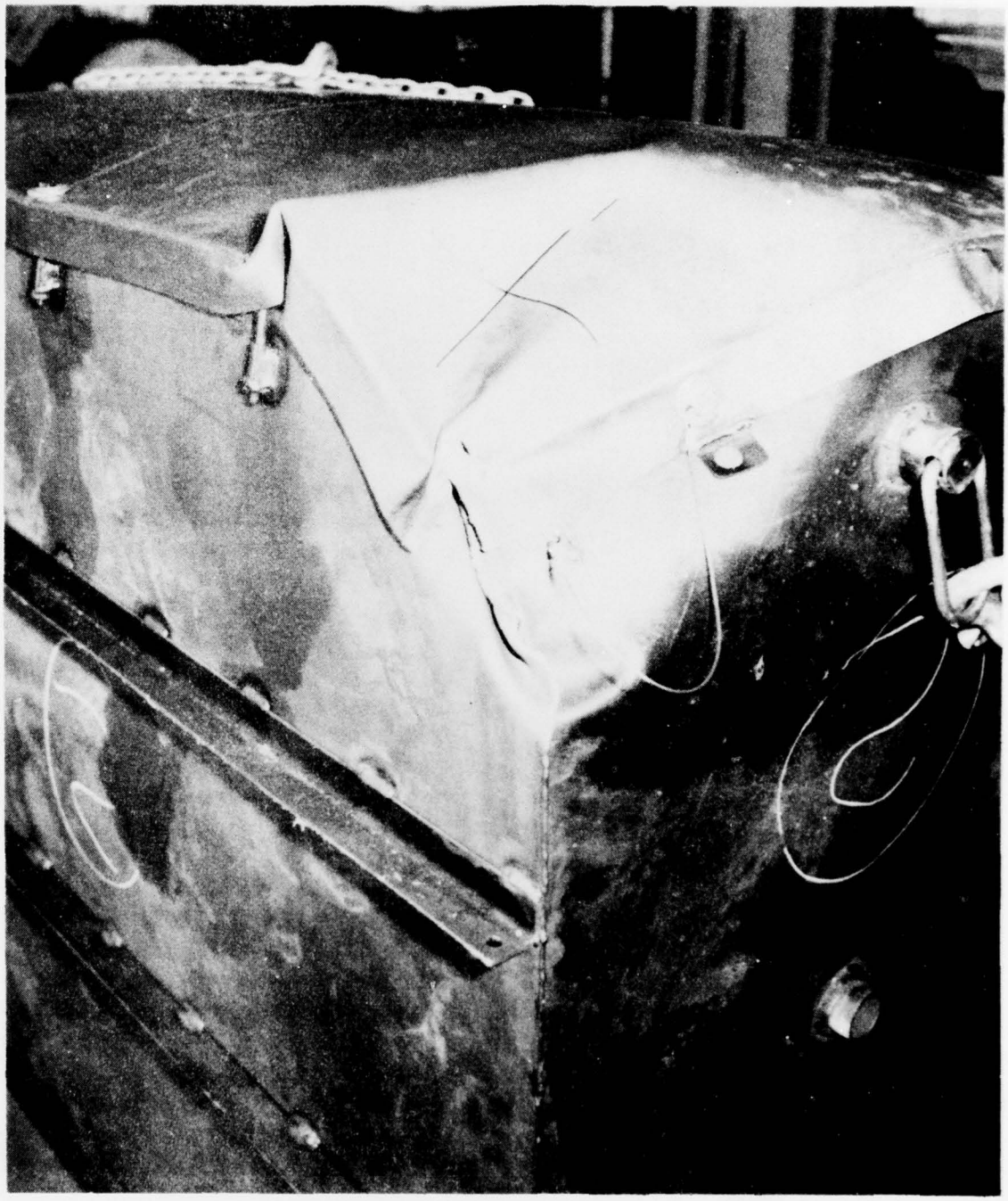

FIGURE 9. RESULTS OF PREMATURE DROP ON CONTAINER DESIGN B

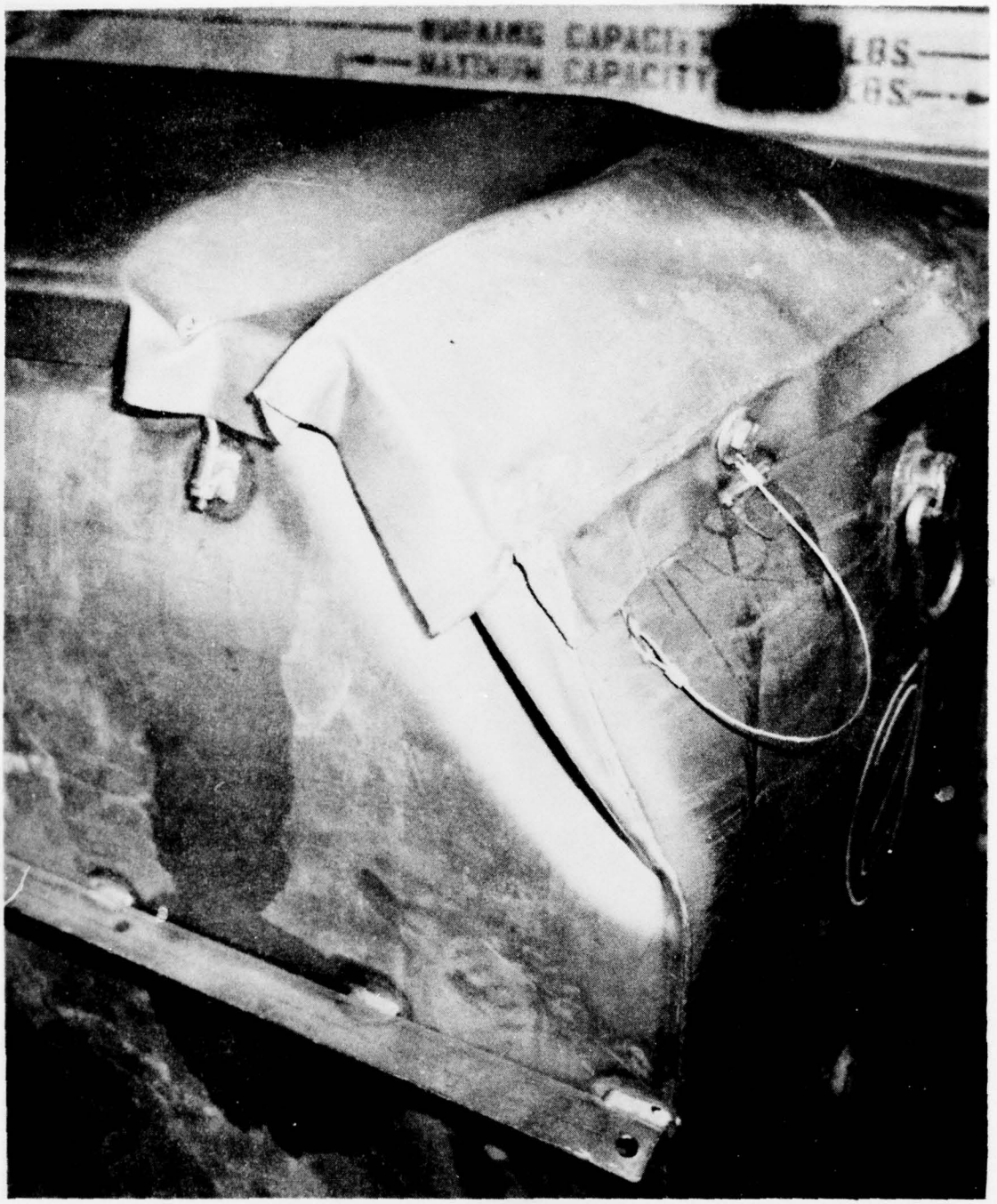

FIGURE 10. DAMAGE FROM FOUR FOOT DROP ON CONTAINER DESIGN B

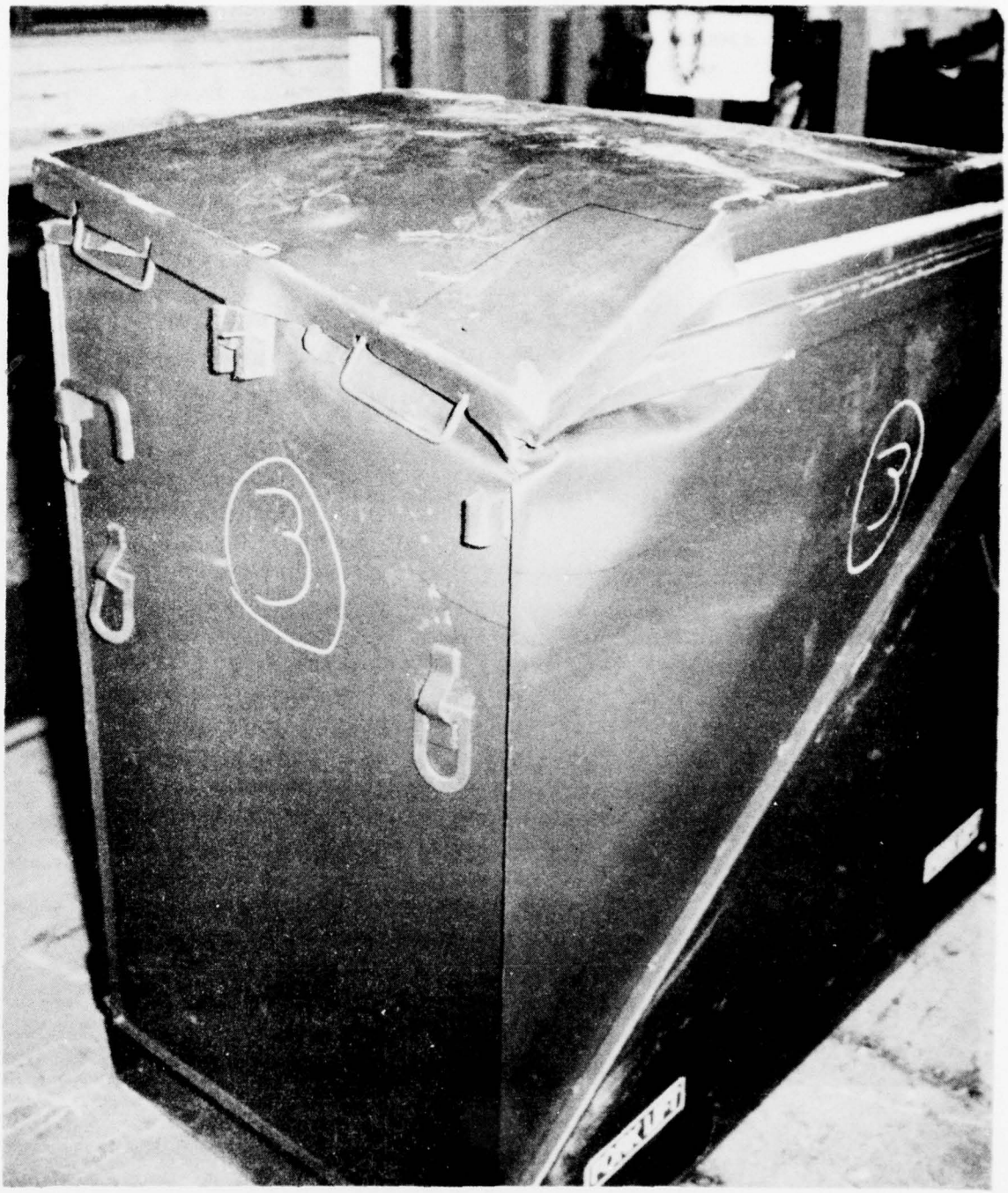

FIGURE 11. DAMAGE FROM FOUR FOOT DROP ON CONTAINER DESIGN C

FIGURE 12. OPENING CREATED BY FOUR FOOT DROP
ON DESIGN C

FIGURE 13. DAMAGE TO DESIGN C, JUST AFTER FOUR FOOT DROP

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